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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,470	10/27/2003	Brian Keith Cabral	MSFT-2830/191773.02	2508

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EXAMINER	
CHUNG, DANIEL J	
ART UNIT	**PAPER NUMBER**
2677	

DATE MAILED: 07/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/694,470	CABRAL ET AL.	
	Examiner	Art Unit	
	Daniel J. Chung	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1-10-05*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-70* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-70* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claims 15-70 are presented for examination. Claims 68-70 have been added by the amendment filed on 1-10-2005.This office action is in response to the amendment filed on 1-10-2005.

Information Disclosure Statement

The IDS filed 7-20-1998 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. Specifically, All U.S. patents have been considered, but copies of the other documents have apparently not been provided, and thus the information referred to therein have not been considered. Applicant must provide copies of these documents if there are to be considered as to the merits.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 15-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szeliski et al (6,215,496) in view of Bastos ("Increased Photorealism for Interactive Architectural Walkthroughs"), and further in view of Peercy et al (6,163,319).

Regarding claim 15, Szeliski et al discloses that the claimed feature of a method for rendering an object having light reflective properties, the method comprising: determining a destination viewing vector [i.e. "intermediate motion vector"] for rendering the object from a destination viewpoint (See Abstract line 1-9, Fig 7, Fig 13, col 2 line 30-32, col 5 line 37-43); determining a set of source radiance environment maps ["source sprites"] each having an associated source viewing vector ["source input vector"], each source viewing vector representing a different viewpoint ["viewed from different angles", "view dependent"] associated with the source radiance environment map ["source sprites"] (See col 2 line 30-32, col 5 line 37-43), [each source radiance environment map including information indicative of a light reflective property of the object] and comprising texels that each represent a pre-integrated value of total reflected radiance; warping ["forward mapping"] each source radiance environment map ["source sprite"] of the set of source radiance environment maps based on the destination viewing vector and the source viewing vector associated with the source radiance environment map (See Abstract line 1-9, Fig 5-7, Fig 9-10, Fig 12-13, col 1 line 11-15, col 2 line 4-7, col 2 line 21-32); and blending the warped source radiance environment maps to create a destination radiance environment map ["destination sprites"]. (See Abstract line 1-9, Fig 7, Fig 13)

Szeliski et al does not explicitly disclose that "source radiance environment map including information indicative of a light reflective property of the object." However, such limitation is shown in the teaching of Bastos et al. [i.e. "precomputation of the reflection visibility", "decomposing into incoming radiance and a BRDF", "decomposing the illumination into components that can be precomputed'] (See **Abstract, 2. Contributions** in p.183, 4th paragraph in **3. Related work** in p.184, **4. Overview** in p.184, **8.1.2. related work in image-based rendering** in p.186, **10. Conclusions** in p. 189, Fig 1, Fig 3) It would have been obvious to one skilled in the art to incorporate the teaching of Bastos et al into the teaching of Szeliski et al, in order to provide "the preprocessing of view-independent and view-dependent components and the fast rendering of globally illuminated scenes", (See **Abstract** line 1-8, **Conclusions** line 1-9 in Bastos et al) as such improvement is also advantageously desirable in the teaching of Szeliski et al [by adding "reflected radiance" with depth values of input source sprite], thereby rendering destination image with faster processing time.

Also, Szeliski et al does not specifically disclose that source radiance environment map having pre-integrated total reflected radiance values. However, such limitation is shown in the teaching of Peercy et al. [i.e. pre-processing for texture map (texel) with computed value of reflected radiance] (See col 3 line 35-45, col 5 line 53-59, col 11 line 5-53, col 12 line 15-19, col 13 line 54-col 14 line 20, col 22 line 5-20) It

would have been obvious to one skilled in the art to incorporate the teaching of Peercy et al into the teaching of Szeliski et al, in order to "reduce the number of calculations required during rendering" (See col 12 line 33-37 in Peercy et al), as such improvement is also advantageously desirable in the teaching of Szeliski et al for rendering destination image at rapid manner.

Regarding claim 16, Szeliski discloses that the object can be rendered in a reflection space with texture mapped ["texture mapping"] from the destination radiance environment map ["destination sprites"]. (See col 1 line 54-60, col 4 line 37-40, col 6 line 33-34, Fig 7, Fig 13)

Regarding claim 17, refer to the discussion for the claim 15 hereinabove, Bastos et al further discloses that the object can be rendered without performing an integration during rendering. [i.e. "precomputation of the reflection visibility", "decomposing into incoming radiance and a BRDF", "decomposing the illumination into components that can be precomputed'] (See **Abstract**, **2. Contributions** in p.183, 4th paragraph in **3. Related work** in p.184, **4. Overview** in p.184, **8.1.2. related work in image-based rendering** in p.186, **10. Conclusions** in p. 189, Fig 1, Fig 3)

Regarding claims 18-19, Szeliski et al discloses that providing the destination radiance environment map to a graphic hardware system to render the object with

texture environment mapping of the destination radiance environment map. (See col 1 line 54-60, col 4 line 37-40, col 6 line 33-34)

Regarding claims 20-21, refer to the discussion for the claim 15 hereinabove, Bastos et al discloses that mirror/normal reflection warping each source radiance environment map. (See 8.1. what is reflected)

Regarding claims 22-23, refer to the discussion for the claim 15 hereinabove, Bastos et al discloses that pre-integrating a bi-directional reflection distribution function with a lighting environment to create the set of source radiance environment maps, wherein warping each source radiance environment map with a warping function that models the bi-directional reflection distribution function. (See **Abstract**, **2. Contributions** in p.183, 4th paragraph in **3. Related work** in p.184, **4. Overview** in p.184, **8.1.2. related work in image-based rendering** in p.186, **10. Conclusions** in p. 189, Fig 1, Fig 3)

Regarding claim 24, Szeliski et al discloses that generating meshes with warped sets of texture coordinates, each mesh having a respective set of warped texture coordinates corresponding to a respective warped source radiance environment map. (See col 1 line 49-51)

Regarding claim 25, refer to the discussion for the claim 15 hereinabove, Bastos et al discloses that blending the warped source radiance environment maps at a respective weight ["weight"], and accumulating the blended warped source radiance environment maps in a buffer to create the destination radiance environment map. (See Abstract, Fig 3)

Regarding claims 26-28, refer to the discussion for the claim 15 hereinabove, Bastos et al further discloses that computing a set of weights ["weight"] for the set of source radiance environment maps, normalizing the set of weights, and normalizing the destination radiance environment map based on the normalized set of weights. (See **5. Decomposition of illumination**, Abstract, Fig 3)

Regarding claim 29, refer to the discussion for the claim 15 hereinabove, Bastos et al further discloses that loading the normalized destination environment map image into a texture memory ["texture memory"]; and rendering the object, wherein rendering step includes texture environment mapping the normalized destination environment map onto the object. (See **5. Decomposition of illumination**, Abstract, Fig 3)

Regarding claim 30, refer to the discussion for the claim 15 hereinabove, Bastos et al further discloses that loading a global set of source radiance environment maps each having an associated source viewing vector, each source viewing vector representing a different viewpoint ["view dependent"] associated with the source

radiance environment map, each source radiance environment map including information indicative of a light reflective property of the object ["BRDF"]; determining a subset of source viewing vectors which are nearest to the destination viewing vector; and wherein warping each source radiance environment map comprising warping each source radiance environment map associated with the subset of source viewing vectors. (See **Abstract, 2. Contributions** in p.183, 4th paragraph in **3. Related work** in p.184, **4. Overview** in p.184, **8.1.2. related work in image-based rendering** in p.186, **10. Conclusions** in p. 189, Fig 1, Fig 3)

Regarding claim 31, refer to the discussion for the claim 15 hereinabove, Bastos et al further discloses that loading a sphere geometry for each source radiance environment map. (See "sphere map" in **5. Decomposition of illumination, 6. Rendering pipeline)**

Regarding claims 32-48, claims 32-48 are similar in scope to the claims 15-31, and thus the rejections to claims 15-31 hereinabove are also applicable to claims 32-48.

Regarding claims 49-65, claims 49-65 are similar in scope to the claims 15-31, and thus the rejections to claims 15-31 hereinabove are also applicable to claims 49-65.

Regarding claims 66-67, refer to the discussion for the claim 15 hereinabove, Bastos et al further discloses that a graphic hardware system (See Fig 3) that receives

the destination radiance environment map ["radiance maps"] created by the processor [" and renders the object with texture environment mapping of the destination radiance environment map ["radiosity mesh/texture"], and a geometry engine ["render geometry"] that receives the destination radiance environment map and performs geometric computations on the destination radiance environment map; a rasterizer that receives the computed destination radiance environment map and rasterizes the computed destination radiance environment map [i.e. "final image"]; a texture mapper [i.e. "kernel texture", "reflectance texture"]; and an environment mapper ["modulation"], the texture mapper and environment mapper mapping texture and environment to the rasterized destination radiance environment map for rendering the object. (See Fig 3)

Regarding claim 68, refer to the discussion for the claim 15 hereinabove, Peercy et al further discloses that the texels that each represent the pre-integrated value of total reflected radiance represent total reflected radiance for one possible orientation of a hemisphere above the object. (See col 11 line 38-53, col 13 line 54-col 14 line 20, col 22 line 5-20)

Regarding claims 69-70, claims 69-70 are similar in scope to the claim 68, and thus the rejection to claim 68 hereinabove is also applicable to claims 69-70.

Response to Arguments/Amendments

Applicant's arguments with respect to claims 15-67 have been considered but are moot in view of the new ground(s) of rejection. Specifically, in response to applicant's argument that the cited references do not discloses that source radiance environment map having pre-integrated total reflected radiance values, the newly submitted reference (Peercy et al) discloses such claimed feature. [i.e. pre-processing for texture map (texel) with computed value of reflected radiance] (See col 3 line 35-45, col 5 line 53-59, col 11 line 5-53, col 12 line 15-19, col 13 line 54-col 14 line 20, col 22 line 5-20). See the rejection hereinabove.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Chung whose telephone number is (571) 272-7657. He can normally be reached Monday-Thursday and alternate Fridays from 7:30am- 5:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael, Razavi, can be reached at (571) 272-7664.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

571-273-8300 (Central fax)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

djc
June 29, 2005

MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600